FLOOD INSURANCE STUDY

CITY OF UMATILLA, FLORIDA

LAKE COUNTY

APRIL 3, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 120139

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

CITY OF UMATILLA,
LAKE COUNTY,
FLORIDA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Umatilla, Lake County, Florida, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for Crescent Lake, East Lake, Lake Pearl, Lake Owen, Muscle Lake, and Lake Yale were obtained from the Flood Insurance Study for Lake County, Florida (Reference 1).

The hydrologic and hydraulic analyses for the remainder of this study were performed by the U.S. Geological Survey (USGS), Water Resources Division, (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 75139. This study was completed in August 1987.

1.3 Coordination

On April 27, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Umatilla, Lake County, Florida. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Lake Palm, Lake Geneva, Lake Ella, Lake Mary, Lake Enola, Lake Umatilla, Crescent Lake, East Lake, Lake Pearl, Lake Owen, Muscle Lake, and Lake Yale was studied in detail.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through August 1992. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Umatilla.

2.2 Community Description

The City of Umatilla is in north-central Florida, between the unincorporated area of Altoona on the north and the City of Eustis on the south, and is surrounded by the unincorporated areas of Lake County. Umatilla is served by State Roads 19, 250, and 44A, and the CSX railroad. The 1980 population of Umatilla was reported to be 1,872 (Reference 2).

2.3 Principal Flood Problems

Principal flood problems in the City of Umatilla are due to six interconnected lakes. Lake Palm and Lake Geneva are connected by a 24-inch culvert and flow into Lake Enola through an 18-inch culvert. Lake Ella and Lake Mary are connected by an 18-inch culvert and flow into Lake Enola over a broad-crested spillway. Lake Enola flows into Lake Umatilla through a 60-inch culvert. Outflow from Lake Umatilla is over a broad-crested spillway into Eustis Meadows, a swampy area southeast of the city.

Potential flood damage is primarily limited to lakeside homes around Lake Palm, Lake Ella, and Lake Umatilla. It is assumed that the 100-year flood for those lakes would not inundate any existing roads in the study area.

The maximum flood elevation at the USGS gage station located on the southern shore of Lake Umatilla for the period of record 1970-1985 is 68.66 feet National Geodetic Vertical Datum of 1929 (NGVD). The maximum known flood elevation on Lake Umatilla of 70.5 feet NGVD occurred during Hurricane Donna in 1960.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

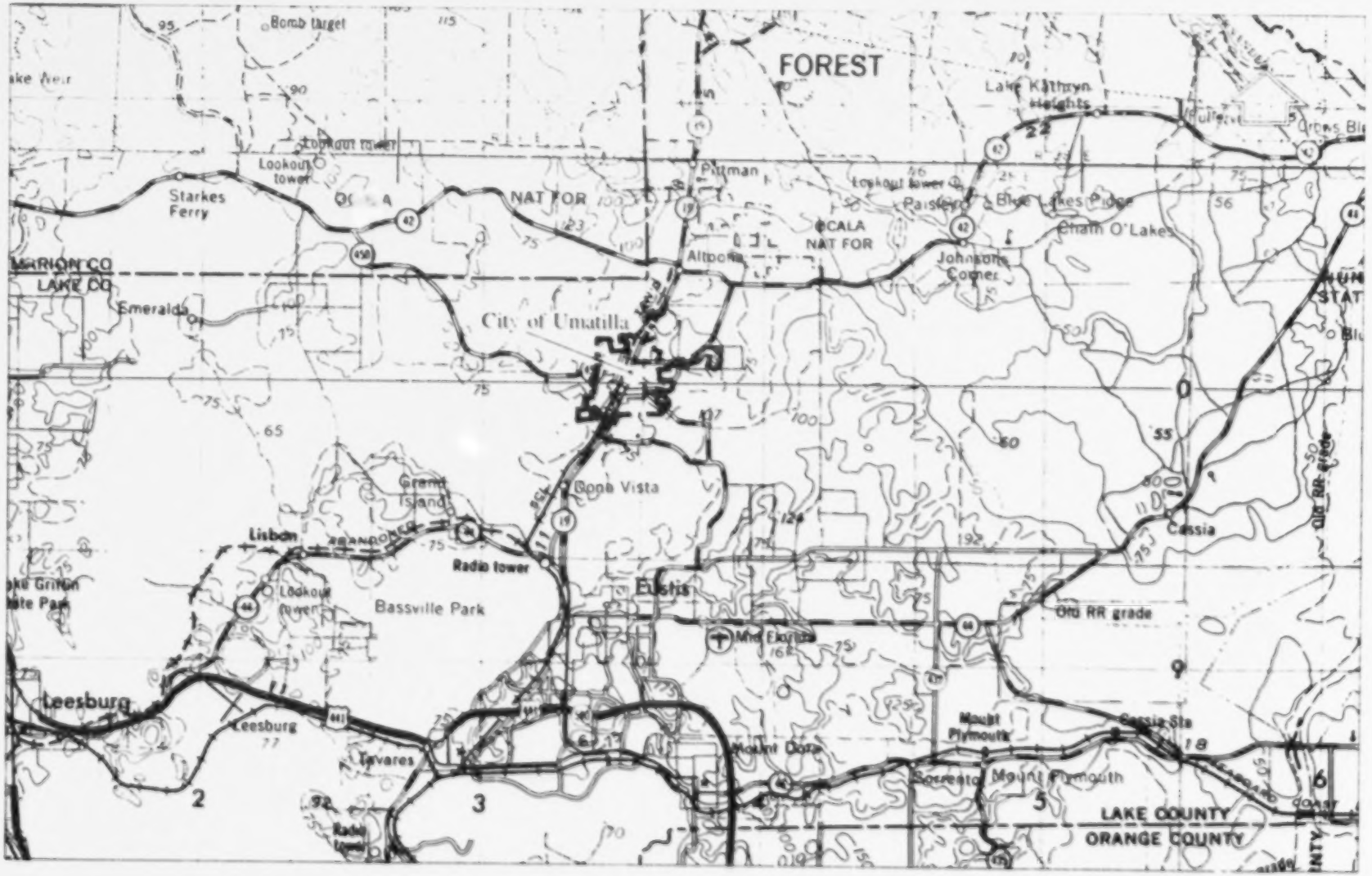

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF UMATILLA, FL
(LAKE CO.)

APPROXIMATE SCALE
4 0 4 8 12 MILES

VICINITY MAP

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic and Hydraulic Analyses

Hydrologic and hydraulic analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail affecting the community.

Equations for rural areas developed in USGS Report 82-4012 (Reference 3) were used with the estimated local drainage basin parameters for each lake to estimate the 100-year rural peak discharge. Equations developed in USGS Water Supply Paper 2207 (Reference 4) were used to adjust the 100-year rural peak discharge to the 100-year urban peak discharge. The parameters used in the regionalized regression equations include basin drainage area; basin slope; basin length; basin storage; impervious area; two-hour, two-year estimated rainfall; and a basin development factor. The basin parameters were determined using a topographic map (Reference 5). The rainfall parameter was taken from TP-40 (Reference 6). The basin development factor was chosen by engineering judgment and based on field observation. Flood inflow hydrographs for each lake were estimated using a unit-hydrograph method described in USGS Open-File Report 82-365 (Reference 7).

Hydraulic analyses of the basins in Umatilla were performed to provice estimates of the elevation of the 100-year flood. For the routing analyses, a relationship between lake-stage and lake-storage volume for each lake was determined. The stage-storage relationship was determined from contours obtained from a topographic map (Reference 5). Structural geometry and elevations of culverts were obtained from field surveys. For culverts, the coefficient of discharge was assumed to be 0.80 and the roughness factor (Manning's "n") was assumed to be 0.015. Outflows from Lake Mary and Lake Umatilla were computed using a broad-crested-spillway equation. The

coefficient of discharge for outflows from Lake Mary and Lake Umatilla was assumed to be 2.0.

The 100-year water-surface elevations for Lake Pearl, Lake Owen, Muscle Lake, and Lake Yale were determined using aerial photographs taken at the time of actual flooding and delineated onto topographic maps (Reference 5).

The remaining water-surface elevations for the 100-year flood were computed using an interconnected lake routing computer program developed for this study. The computer program accounts for storage, flow through connecting culverts, flow over broad-crested weirs including submerged flow, local inflow, and possible reverse flows out of the lakes. The discharge for each lake culvert was computed using a simplified version of the culvert equations described by the USGS (Reference 8).

Data for fifteen years of continuous record and one historical peak are available for Lake Umatilla. A lake volume-frequency analysis similar to that described in Bulletin No. 17B (Reference 9) was performed for Lake Umatilla and indicated a 100-year flood elevation of 70.4 feet NGVD. That elevation is in general agreement with the 100-year flood elevation of 69.9 feet NGVD generated by the USGS procedures.

The 100-year flood elevation of 71.3 feet NGVD determined for Lake Ella is approximately 9 feet less than the 100-year flood elevation of 80 feet NGVD for Lake Ella reported in the Flood Insurance Study for Lake County (Reference 1). The original flood elevation of 80 feet NGVD was determined by overlaying aerial photographs of the area taken during Hurricane Donna onto topographic maps. Flood elevations caused by Hurricane Donna were assumed to be the 100-year flood elevations. An 80-foot-NGVD flood elevation on Lake Ella would inundate Lake Mary, Lake Enola, and Lake Umatilla, and a large portion of the southern incorporated area of Umatilla. Local residents of Umatilla stated that those areas were not flooded during Hurricane Donna in 1960. Accordingly, the 100-year flood elevation for Lake Ella shown in the Flood Insurance Study for Lake County is presumed to be invalid.

Flood elevations in Umatilla may be raised by debris blockage of the culverts between lakes. The hydraulic analyses for this study, however, are based on the effects of unobstructed flow. The flood elevations shown on the map are thus considered valid only if the culverts remain unobstructed and do not fail.

Elevations for the 100-year floods of the lakes studied in detail are shown in Table 1.

TABLE 1 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	PEAK ELEVATION (FEET NGVD) 100-YEAR
LAKE PALM along shoreline	79.7
LAKE GENEVA along shoreline	75.1
LAKE ELLA along shoreline	71.3
LAKE MARY along shoreline	71.5
LAKE ENOLA along shoreline	71.5
LAKE UMATILLA along shoreline	69.9
CRESCENT LAKE along shoreline	70.1
EAST LAKE along shoreline	80.0
LAKE PEARL along shoreline	80.0
LAKE OWEN along shoreline	70.0
MUSCLE LAKE along shoreline	70.0
LAKE YALE along shoreline	61.5

All elevations are referenced to the NGVD. Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year

floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each flooding source studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations. The boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 5 feet (Reference 5).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 OTHER STUDIES

A Flood Insurance Study published for Lake County, Florida (Reference 1), is not in agreement with this study. The 100-year elevation for Lake Ella shown in the Lake County study is superseded by the elevation shown in this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Town of Umatilla, Florida (Reference 10).

7.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

8.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, Lake County, Unincorporated Areas, Florida, April 1982.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Florida, Washington, D.C., February 1982.

3. U.S. Geological Survey, Water Resources Investigations Report 82-4012, Techniques for Estimating Magnitude and Frequency of Floods on Natural-Flow Streams in Florida, W.C. Bridges, 1982.

4. ----------, Water Supply Paper 2207, Flood Characteristics of Urban Watersheds in the United States, V.B. Sauer, V.A. Stricker, W.O. Thomas, and K.V. Wilson, 1983.

5. ————, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 5 Feet: Umatilla, Florida, 1980.

6. U.S. Department of Commerce, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., January 1963.

7. U.S. Department of the Interior, Geological Survey, Open-File Report 82-365, Techniques for Estimating Flood Hydrographs for Ungaged Urban Watersheds, V.A. Sauer and V.A. Stricker, 1982.

8. U.S. Geological Survey, Water Resources Investigations, Measurement of Peak Discharge at Culverts by Indirect Methods, G.L. Bodhaine, 1968.

9. U.S. Department of the Interior, Geological Survey, Interagency Advisory Committee on Water Data, Office of Water Data Coordination, Hydrology Subcommittee, Bulletin No. 17B, Guidelines for Determining Flood Flow Frequency, September 1981, revised March 1982.

10. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Umatilla, Lake County, Florida, January 1976.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0005	97.59	U.S. Geological Survey disk stamped "IWPC 1962" set in concrete gas pump island about 200 feet northeast of intersection of Central Avenue and West Ocala Street, 50 feet west of centerline of Central Avenue
2	0005	84.85	north flange bolt on fire hydrant at southeast corner of intersection of West Ocala Street and Hillside Avenue
3	0005	83.92	railroad spike approximately 2 feet above ground in power pole at southwest corner of intersection of Pearl Street and Hillside Avenue
4	0005	82.10	railroad spike approximately 2 feet above ground in power pole at intersection of Guerrant Street and Wingfield Drive
5	0005	88.45	north flange bolt on fire hydrant at southeast corner of intersection of Central Avenue and Mebane Street